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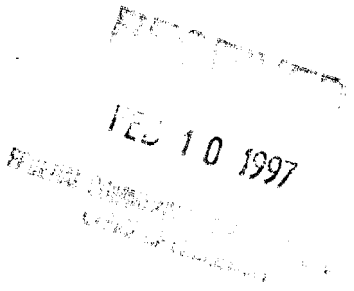
February 10, 1997

Mr. William F. Caton
Acting Secretary
Federal Communications Commission
Room 222
1919 M Street, N.W.
Washington, D. C. 20554



Re: PR Docket No. 92-235
Ex Parte Presentation

Dear Mr. Caton:

This is to advise that today Lee Barnes, past President of the International Taxicab and Livery Association; Alfred B. LaGasse, Executive Vice President of the Association; and the undersigned, met with Rudolfo M. Baca of Commissioner Quello's office; Julius Genachowski of the Chairman's office and Suzanne Toller of Commissioner Chong's office regarding re-farming. Items discussed during the meeting are a matter of public record in the docket of this proceeding except to the extent referenced in the attachment and in the filing being tendered under separate cover this date.

An original and one copy of this letter is supplied for inclusion in the Commission's docket file.

Sincerely,

William K. Keane
Counsel for International Taxicab
and Livery Association

cc: Julius Genachowski
Rudolfo M. Baca
Suzanne Toller

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Comments
of the
International Taxicab and Livery Association
to the
Wireless Telecommunications Bureau
of the
Federal Communications Commission

Prepared by:
BIA Consulting, Inc.

May 10, 1996

CONSULTING

BIA CONSULTING, INC. 14595 AVION PARKWAY, SUITE 500, CHANTILLY, VA 22021
PHONE 703-818-2425 FAX 703-803-3299

May 10, 1996

Mr. Alfred LaGasse
Executive Vice President
International Taxicab and Livery Association
3849 Farragut Avenue
Kensington, MD 20895

Dear Mr. LaGasse:

In accordance with your request, BIA Consulting, Inc. ("BIA") has completed a study concerning the usage of private radio systems by taxi and livery companies and the effects of a presumptive reliance on third-party providers versus private radio systems.

BIA has concluded the following: 1) allocated spectrum is utilized in an efficient manner; 2) the Industry has specialized needs that are not met by third-party providers; 3) there is no basis to conclude that third-party providers can offer service to the Industry at a cost reduced from that currently borne; and 4) reliance on third-party providers would impair the ability of the taxi and livery industry to efficiently serve the public.

The basis for these conclusions are set forth in the attached report.

Very truly yours,
BIA CONSULTING, INC.

John P. Audet
Senior Financial Consultant

Enclosure

jpa/bh

TABLE OF CONTENTS

EXECUTIVE SUMMARY

- The International Taxicab and Livery Association (ITLA) is a nonprofit trade association that has represented taxi and livery companies since 1917. The ITLA is the FCC-designated frequency coordinator for the Taxicab Radio Service.

- The taxi and livery industry is made up of over 15,000 companies that operate over 200,000 vehicles and provide work for over 350,000 men and women who transport 2 billion passengers per year (20% of all public transit service without subsidy).

- Approximately 60% of taxi passengers are elderly, disabled, low income and other people without access to an automobile or other forms of public transit. The other 40% of taxi passengers are business travelers who are vital to commerce.

- Taxis serve 2,000 communities, 24 hours per day, 365 days per year. Taxi passengers are distributed by geographic area as follows: urban - 39%; suburban 17%; small city - 30%; and rural 14%.

- Taxi service is vital to commerce, health, safety and societal well-being. The distribution of taxi trips is as follows: business - 26%; social - 21%; airport - 15%; when in a hurry or no other public transportation available - 9%; medical - 8%; grocery shopping - 7%; car in shop - 2%; to run errands - 2%; to pick up children - 1%; emergency - 1%; safety at night - 1%; and all other reasons - 7%.

- In non-exclusive, shared-use circumstances, taxi and livery users manage interference which allows greater utilization of frequencies than is accomplished with commercial systems.

- Taxi single channel utilization efficiency (number of users served) is higher since the taxi user tolerates more blocking than a commercial entity whose utilization efficiency is dictated by the service quality demands of the average customer.

- An asynchronous transmission protocol is standard for most taxi and livery operators. This configuration is atypical of commercial systems and would require major modification or dedication of channels to permit this mode of transmission.

- ITLA members are service providers of last resort to the general public. Private communications systems allow them to fulfill that need in a cost effective and timely manner.

- Private radio systems allow the licensee to prioritize traffic in times of heavy load or emergency. For all practical purposes, a commercial provider can only prioritize by price.

- ITLA members utilize private radio to serve their locally-franchised and licensed area of operation. Elimination of private radio, and a forced migration to commercial systems, will strand many operators in positions of insufficient radio coverage or insufficient peak capacity.

- The rapid pace of technological innovation, and the Commission's preference not to mandate specific technical standards, creates the very real possibility that private users forced onto multiple commercial systems to get the coverage they need will be faced with incompatible technologies.

- Any required move to more efficient spectrum utilization techniques requires replacement of the mobile radio. For large fleet operators, this expense dwarfs base station and other infrastructure costs.

- At present prices, a commercial system may be 10 times as costly as private radio system.

- At the present time, if price is the only consideration -- which it is not -- only smaller or more rural ITLA members could consider commercial providers as a viable alternative to in-house systems.

- Even if commercial prices fall precipitously, a dramatic increase in overall expense for private users is predicted.

- Prices for commercial wireless services -- in the long run -- can never fall below a level where an adequate investment return can be realized. Consequently, for significant taxi fleets price will not drop to a point where it is more economical to purchase service from a commercial provider.

- Price wars are chaotic, businesses fail. If former private radio users are forced onto commercial systems that ultimately fail, service to the public will be adversely affected.

INTRODUCTION

The International Taxicab and Livery Association (ITLA) is a nonprofit trade association that has represented private sector providers of public ground transportation since 1917. ITLA is the only national association that represents all types of community-based, for-hire, passenger carrying fleets — taxicabs, executive sedans, limousines, vans, minibuses, and paratransit. For nearly half a century, ITLA has served as the FCC-designated frequency coordinator for the Taxicab Radio Service.

INDUSTRY OVERVIEW

There are approximately 15,000 private companies providing public transportation in the United States. These passenger-carrying fleets operate well over 200,000 vehicles, provide work for over 350,000 men and women, and transport over 2 billion passengers per year. Without subsidy, this industry provides 20% of all public transit service in the United States. Of critical importance is the fact that these private companies provide transit service 24 hours per day, every day of the year, serving not only the finest hotels, but also the poorest of inner city housing projects.

The industry is a critical element in meeting local commerce, health, safety, and welfare transportation needs. The transit service provided is vital to meeting the mobility needs of the business traveler whose activities are critical to local and national commerce, as well as to the low income person who needs to get to the hospital, but has no car or other means to get there. Nearly two-thirds of all taxi customers are elderly, disabled, low income, or other transportation disadvantaged individuals who do not have access to an automobile or to other form of public transportation.

Today, 39% of all taxicab service is provided in urban areas, 17% in suburban areas, 30% in small communities, and 14% in rural areas. The industry serves all social and economic classes. Disabled persons and seniors receive essential transportation service from taxis and paratransit vans. Taxis provide parents a safe alternative for taking children to after-school activities and back home. Lonely and isolated elderly people depict taxicabs and paratransit vans as lifesavers that are their connections to the world. Dialysis patients see taxi and livery service as the difference between life and death.

On the basis of an anonymous telephone call, the taxi and livery industry often provides immediate transportation service at two o'clock (a.m. or p.m.) in the central business district or the most crime ridden area of the community. This may account for the fact that the National Institute for Occupational Safety and Health of the U.S. Department of Health and Human Services has

determined that driving a taxicab is the job with the highest rate of occupational homicide in America. Taxicab drivers experience a homicide rate of 15.1 murders per 100,000 workers. The second highest homicide rate was for law enforcement officers at 9.8 murders per 100,000 workers.

Characteristics of Taxi Riders and Trip Purpose

The Gallup Organization, Inc., Princeton, New Jersey, studied the characteristics of the typical taxicab passenger and typical taxicab trip. From these user characteristics we can determine that elderly persons, low income persons, minorities, and females rely quite heavily on taxicabs to meet their local transportation needs.

The typical taxicab trip for all users was determined by The Gallup Organization to be for: business - 26%, social - 21%, airport - 15%, when in a hurry or no other public transportation available - 9%, medical - 8%, grocery shopping - 7%, car in shop - 2%, to run errands - 2%, to pick up children - 1%, emergency - 1%, safety at night - 1%, all other reasons - 7%. Of course, the typical trip purpose for any segment of the population will vary based on their needs. For example, 24% of taxi trips for the elderly are taken for medical visits.

ITLA Member Survey of Communications System Function & Usage

ITLA recently surveyed members and requested information about their communications systems and how they were used. In general, respondents operate in medium and large markets in the U.S. However, it must be stressed that ITLA members do not have exclusive, *i.e.*, monopolistic territories. Consequently, one should be mindful that the results presented herein, represent the average statistics of a taxi and livery company, and not the total need for service in a particular market.

All of the respondents own their own communications system. The average respondent had over 265 vehicles in their fleet: fleet composition is shown in Figure 1. According to the survey, the average number of passengers transported per day per company is in excess of 4,300.

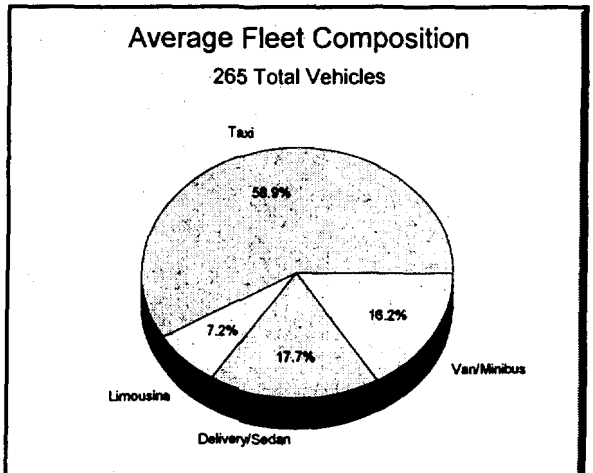

Figure 1

In-house communications systems are used for a variety of functions as shown in Figure 2. Recently, many ITLA members have installed analog data dispatch systems, to improve the efficiency of communications and message throughput as well as to provide such services as credit card verification for payment.

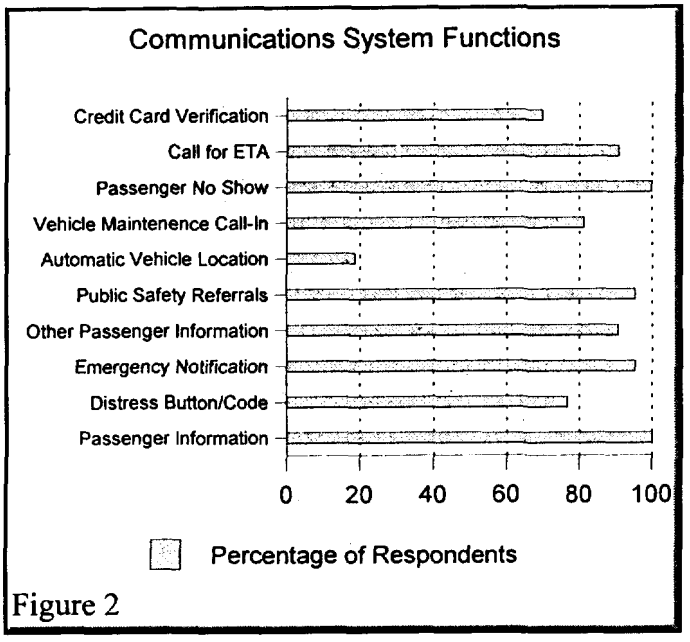

Figure 2

Peak busy hour load averages over 5,600 one-way transmissions per hour. For every passenger carried, there are approximately 15 unique transmissions between the vehicle and the dispatch center. On average, total transmissions per vehicle per day are well over 300. This figure is probably understated since it presumes that every vehicle was in use every day and does not reflect time-out-of-service.

On average, survey respondents had invested approximately $575,000 in their communications system. This includes expenditures for base station transmitters and infrastructure, mobile radios, and computerized dispatch systems.

The average respondent employs 17 dispatchers and telephone operators on a normal weekday. Annual operating expenses of a typical company for the dispatch center and communications system average over $410,000[1].

EFFICIENCY

Throughout the history of the Commission, its mandate has been to allocate frequencies in a manner which promotes spectrum efficiency and, hence, the public interest, convenience and necessity.

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[1] It should be noted that most of these expenses would not be eliminated by a forced move to a commercial provider. Most of the expense is associated with maintenance of the mobile radios, dispatch center equipment, and salaries for telephone and dispatch operators. Service air-time costs would be in addition to the foregoing.

However, in order to provide a framework for discussion, the definition of efficiency must be clarified; only then can one analyze the relative efficiency of alternatives. From the pure regulatory aspect, there are two components of efficiency: spectral efficiency and channel utilization efficiency.

Spectral efficiency is a function of reuse efficiency, channel width, and to a lesser extent modulation method, *i.e.*, digital vs. analog. Traditionally, the Commission has focused on channel width and modulation. Reuse efficiency is a function of the first two parameters determined by a required carrier to interference (C/I) ratio and balanced by the need for geographic coverage.

Channel utilization efficiency refers to the amount of time that an RF channel is occupied and how many customers it serves. In the abstract, there is no difference in efficiency for a channel used by one customer for 30 minutes versus a channel used by 30 customers for 1 minute each.

Shared Use Licensing

In the private radio services, and specifically the Taxicab Radio Service, which is of particular concern to the ITLA, the frequencies are licensed on a non-exclusive, shared basis. This non-exclusivity presumption means that licensees must be prepared to share the frequency with other qualified users within the confines of reasonable engineering parameters.

Consequently, the taxi and livery user of these frequencies must tolerate interference and manage potential blocking[2] to a much greater level than frequencies allocated to commercial services which are typically licensed on an exclusive basis.

Shared frequencies have no presumptive "protected service area" or minimum mileage separation between co-channel stations. Consequently, reuse efficiency is -- by definition -- higher than for services which have strict separation criteria. Frequencies allocated on a shared basis squeeze in more base stations by looking at each situation on a case-by case basis. ITLA, and other industry coordinators, attempt to balance the needs of multiple operators based upon required capacity and coverage moderated by tolerable levels of interference. Consequently, usable geographic coverage, *i.e.*, coverage which actually meets the needs of an operator, is more likely to be provided. However, this process, by necessity, creates a level of interference greater than a commercial operator could tolerate in providing service to the general public.

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[2] The likelihood that a channel will be occupied and in use at the time an attempt is made to utilize the channel.

Channel Loading

The Commission has traditionally specified a minimum channel loading of 70 mobiles per channel for conventional paired frequencies. In the SMR service, for trunked systems, the threshold rises to 100 mobiles per channel. ITLA, in coordinating new frequencies for applicants and existing licensees, tries to achieve at least 100 units per channel if no unencumbered frequencies are available.

However, commercial operators, *e.g.*, cellular, SMR, PCS, *etc.*, must be conscious of the grade of service[3] (GOS) being offered to their customer. Using the standard Erlang B[4] traffic tables one can conclude the following:

1. The potential for delay or the denial of service is higher on private systems due to greater loading, a delay which is tolerable since the private system controls the scheduling of the transmissions and;

2. Commercial systems, whether conventional or trunked, leave RF channels idle for a significant part of the time in order to minimize the potential for blocking.

In commercial services, a paying customer expects that a radio channel will be available when service is requested. Yet an ITLA member, because of the limited amount of available frequencies, must schedule its radio transmissions in the most efficient manner. Transmissions can be delayed for a short period of time depending upon the number of required communications, and the priority of such communications in the queue. Calculated blocking rates, using standard traffic engineering tables, show that blocking in private services is much higher compared to commercial services. But high blocking rates utilize the channel more efficiently, *i.e.*, the channel is occupied far more often than a similar channel with low blocking rates.

In actual practice, based upon our survey of ITLA members, occupancy of their single channel systems in the busy hour exceeds 50%.

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[3] Grade of service is synonymous with blocking.

[4] Erlang B is one of the three most commonly used formulas for sizing telecommunications systems.

Practice in Commercial Industry

Commercial providers build to average busy hour load, not to the peak load of any customer. The "busy hour" is generally an average of the busiest hours of some number of the busiest traffic days in a year. Infrastructure to maintain the required GOS is built to satisfy the average need of the customer base.

It is axiomatic that if a commercial operator's customers would tolerate a lower GOS -- a higher rate of blocking -- then the operator could delay additional investments in capital equipment and increase overall profitability. The same is true for the private user: additional expenditures on their communications systems detract from the overall profitability of their core business.

The commercial provider -- who has a differentiated subscriber base -- cannot prioritize among customers. In a competitive environment, it must maintain service quality. However, a specific customer's peak load -- which degrades service to all users -- creates a dilemma for the commercial service provider.. Specifically, does the cost associated with increasing capacity to handle one customer's peak load -- and prevent degradation of service across the board -- generate sufficient revenue so that the company's overall return on investment is not negatively impacted?

Absent an affirmative answer to the foregoing question, communications capacity will not be available. Commercial mobile carriers are reluctant to incur costs which may be necessary to serve a customer whose peak load requirements are significantly above average.

Message Content and Utility

If we compare a single cellular channel or two-way channel in use for 1 hour by one or many calls with a typical ITLA member's use -- hundreds and in many cases thousands of transmissions per hour which are critical to the servicing of the public-- this is a far more efficient usage of the spectrum.

Commercial providers are ambivalent to message content. Yet, the creation of the private radio services indicates the public policy conclusion that all content is not equal; that the finite resource -- the radio frequency spectrum -- had to be managed so that important communications needs are served. If a measure of efficiency is the number of individual users who derive benefit from the provision of service within a finite time frame, then private radio and ITLA members are certainly efficient users of the radio frequency spectrum.

Efficiency Conclusions.

All things being equal, private systems are efficient because they load more users per channel than comparable commercial systems.

Private users manage interference and tolerate blocking to minimize their investment in radio communications relative to their overall business. Consequently, channel utilization efficiency is higher than a commercial entity whose utilization efficiency is dictated by the service quality demands of the average customer.

UNIQUENESS AND SPECIALIZED NEEDS

Asynchronous Mobile/Base

ITLA members use the allocated paired frequencies in a unique way. Taxi and livery fleets generally use the paired frequencies in an asynchronous mode. Specifically, a mobile unit can transmit a message to the base station without restricting the base from transmitting a message to a different mobile unit. With the advent of analog data dispatch systems, this mode of communications has become even more important. Reviewing actual traffic statistics from one ITLA member shows that over 62% of the message traffic is from the mobile to base.

This transmission mode is an outgrowth of the needs and circumstances of taxi and livery fleets. There are specialized business reasons for this technical arrangement, *e.g.*, preventing drivers from conversing with each other, ensuring that passengers assigned to a particular vehicle are actually served by that vehicle, *etc.* Moreover, because of channel congestion on the limited frequencies available, this method increases usage efficiency.

With most commercial systems, when communications is initiated both mobile and base frequencies are unavailable for use until such time as the channel pair is released. Consequently, the availability of the channel pair is limited by the duration of the longest message segment on the in-use frequency, regardless of activity on its counterpart. The taxicab and livery industry's configuration does not have this limitation and this allows for greater efficiency.

Analog data dispatch systems take advantage of asynchronous transmission to dramatically increase the throughput of the system. Messages to and from drivers are handled faster and with less air-time when sent by a data dispatch system operating in this mode. Hence, companies use their

communications system to exchange more message content, and therefore can provide more services with no increase in granted spectrum.

Priority of Communications

The very existence of private radio services indicates a recognition in the past that there was a public policy interest in providing for these communications services. The conclusions drawn were that either 1) these services could not be provided economically by commercial operators; 2) these services would not be provided economically by commercial operators; or 3) communications were of such a critical nature, *i.e.*, time sensitive, proprietary or confidential, *etc.*, to mandate a separate allocation even if commercial providers could and would provide service.

If we assume that today the first two conclusions are no longer true, that commercial providers can and will provide service at an attractive price -- a doubtful proposition -- the issue of criticality would still remain.

ITLA members are the service providers of last resort for many citizens: those who lack access to public transportation, the elderly, disabled, and others who do not own or are unable to drive their own cars. Moreover, taxi and livery companies are necessary for the efficient functioning of the U.S. transportation system. One out of five public transit trips are provided by taxi.

However, if we imagine that private radio services no longer exist, then all users of communications services are lumped together in the commercial provider's customer base. How can a commercial provider prioritize between taxi and livery services who may be transporting patients to hospitals, electrical utility employees attempting to restore service after a major storm, television field crews attempting to communicate with their studios during a live remote broadcast, and numerous other specialized users as well as the general public? Each user feels their need is most critical.

None is most critical: all are critical.

There are a few commercial communications systems which allow prioritization of channel allocation and message traffic. Generally, prioritization must be input to the system as part of the user's profile. Dynamic prioritization, by users, has been shown to fail since every user believes his or her message content to be most critical and all simultaneously attempt to increase their priority level when channels are congested. This unfortunate fact returns the commercial operator to the position of prioritizer of message traffic, *i.e.*, adjudicating whose message is most important on a

real-time basis. Commercial entities are unable and unwilling to do so; indeed it may be unlawful for them to do so. The commercial provider can only ration by price.

Actual statistics for a major market ITLA member show -- as one would expect -- a dramatic increase in requests for service during bad weather, and by consequence, message traffic. Normal weekday dispatched calls are approximately 4,700. During bad weather this figure increases by 10-15%. In terms of channel loading and congestion, calculated system delays increase more than this. Yet, this problem is manageable since the entire communications system is under the control of the taxi company. However, if other entities also see message traffic increase dramatically, and the aforementioned groups are all loaded onto the same commercial system, the system will temporarily collapse.

Most important, driver safety must be considered. It is unfortunate, but true, that driving a taxi is the most hazardous job in the U.S.; more murders per capita than any other occupation. Taxi and livery operators maintain their own communications systems -- many with full hot-standby capability -- in part to provide for immediate emergency communications between the driver and sources of aide. Virtually all taxi companies have special communications procedures to assure quick response to a life-threatening situation.

Locality of Demand

Private radio licenses in the Taxicab Radio Service are currently awarded on a point-specific basis. While this entails an administrative burden on both the coordinator and the Commission, it is a practice which was developed precisely due to its targeted specificity to a potential licensee's communications needs.

Licensees define their coverage criteria, dependent upon the area of their business operations. This can take the form of single site or multiple site systems, depending upon the geographic area to be served and the availability of spectrum.

It has been suggested that wide-area licensing of previously private spectrum to commercial operators would provide the same depth and breadth of coverage in a more spectrally efficient manner. In the abstract, the foregoing proposition may be true, providing the following caveat is never forgotten: the radio coverage provided must be in the economic interest of the commercial entity.

Radio coverage required for business operations is not defined by arbitrary licensing boundaries (MSAs, MTAs, BTAs, EAs, *etc.*). ITLA members are generally licensed by local governmental and regulatory bodies and are allowed to serve passengers only within those boundaries. Political subdivisions, the authorized area of operation for taxi and livery companies, may or may not conform to the radio service area provided by commercial entities -- and would seldom correspond to the wide-area geographic licenses typically put up for bid by the Commission.

Commercialization of the heretofore private radio spectrum would force ITLA members to subscribe to commercial services. A number of scenarios present themselves regarding what service would be available:

1. Full radio coverage is available from a single commercial entity.

2. Full radio coverage is available but only from multiple commercial operators (due to the arbitrary geographic boundaries).

3. Only partial radio coverage is available from any one provider.

4. No radio coverage is available.

While full radio coverage may be available from a single entity, monthly subscription fees associated with that service may be prohibitive. The commercial provider will price their service to recoup the cost associated with the entire network, whereas the private company only needs a portion of that infrastructure and is paying far in excess of its value to the user.

Certainly, there would be few areas where there was a need for service and none available so we can generally dismiss the fourth scenario. Only partial radio coverage being available from <u>any provider</u> is a real possibility in the more rural areas of the U.S. since commercial entities will concentrate their investment in capital equipment and infrastructure in those areas with the greatest population density and potential for revenues.

Finally, wide-area licensing has the greatest potential for requiring ITLA members to subscribe to multiple service providers. The member would be required to pay multiple subscription fees per unit for voice dispatch service or multiple fees for packet data transmission services. It would require the installation of individual trunks from the member's dispatch center to each service provider's point of presence. Of most concern is the potential for technical incompatibility between commercial providers equipment.

One can easily imagine the hypothetical circumstance of a Laurel, MD taxi company, forced to procure service from separate Washington and Baltimore commercial service providers. Coverage in the city of Laurel itself may be less then satisfactory if the two commercial operators have been unable to agree on technical standards and degree of overlap between their two systems[5]. Of additional concern is whether sufficient channel capacity is available in the interstitial area. The commercial operator(s) will have to balance the need for additional capacity in this area against their need for capacity in more densely utilized areas of their system(s). They must coordinate with adjacent operators on the use of these frequencies. It is quite possible that a geographic area will be continuously under-served if the economics of both operators demand frequency reuse in other areas[6].

Uniqueness Conclusions

An asynchronous transmission protocol is standard for most taxi and livery operators. This configuration is atypical of commercial systems and would require major modification or dedication of channels to permit this mode of transmission.

ITLA members are service providers of last resort to the general public. Private communications systems allow them to fulfill that need in a cost effective and timely manner.

Private radio systems allow the licensee to prioritize traffic in times of heavy load or emergency. For all practical purposes, a commercial provider can only prioritize by price.

ITLA members utilize private radio to serve their locally-franchised and licensed area of operation. Elimination of private radio, and a forced conversation to commercial systems, will strand some operators in positions of insufficient radio coverage or insufficient peak capacity.

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5 In particular, one recalls the numerous applications the Commission was forced to adjudicate regarding *de-minimis* overlap between adjacent cellular providers. While the IS-41 networking standard and the revenues to be derived from roaming have forced operators to cooperate, it was for some time a considerable irritant.

6 In the cellular industry, there have been a number of instances where smaller RSA operators, sandwiched between major metro areas, have only been able to use a portion of their licensed spectrum due to an inability to coordinate frequencies. The smaller operator was forced to sectorize or cell-split to increase the capacity of its system.

TECHNOLOGY CONCERNS

In a simpler, analog-only world, incompatibility of equipment was generally not a problem. The Commission mandated modulation method, emission, and numerous other technical parameters to insure compatibility. One could reasonably argue the success of the cellular industry was partially due to the mandating of standards, *e.g.*, customers knew the phone would work wherever they traveled in the U.S. One could also argue that the lack of standards is the reason that AM stereo does not exist today[7].

The Commission is searching for a mechanism to incent the users of the spectrum to more efficient transmission methods. The short list includes narrowband techniques and digital. However, it must be noted that the Commission has mandated minimal technical standards for new services such as narrowband or Broadband PCS[8] and IVDS. Almost 2 years after the IVDS auctions, no system is in operation.

There is an ongoing war for the equipment dollars of the Broadband PCS auction winners. The competing technologies include direct sequence spread spectrum (CDMA) in variations proposed by Qualcomm and Interdigital, *Groupe Speciale Mobile* (GSM), up-banded TDMA, pioneer preference winner Omnipoint's proprietary air interface, as well as PACS, a variant of the European digital cordless technology, all incompatible with the analog AMPS standard. There are at least two competing protocols being proposed for Narrowband PCS. Motorola's iDEN system for digital dispatch is incompatible with the GE/Ericsson EDACs system and E.F. Johnson's digital LTR format. A discussion of the pros and cons is unnecessary: what is obvious is that there is a tremendous potential for the complete "Balkanization" of heretofore nationwide standards.

From the perspective of the private radio community, a migration to other technologies will render worthless the most numerous and expensive portion of their communications system, namely the mobile radio. Of additional concern, is the potential lack of technical standards in the future. If

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[7] The counter-veiling argument is that technical standards inhibit innovation (which may be true). The perpetual question is, what is the greater good?

[8] There is nothing in the Rules requiring a Broadband PCS auction winner to use the most spectrally efficient methods. If they so choose, they can use the most woefully inefficient, outdated transmission methods. The "market" will decide if their choice is valid.

geographic licensing is a concern due to availability of radio coverage, then the likelihood that adjacent system operators will choose incompatible technologies is also a serious concern. Using our Laurel, MD example, a taxi company forced to subscribe to two separate commercial services would need two different radios in each vehicle, if the providers choose different technical equipment or were unable to agree on other standards and degree of overlap between their two systems.

ECONOMICS

Proponents of commercialization of private radio services argue that by increasing the supply of commercial mobile radio providers, prices will fall. Two questions are raised: 1) from the perspective of ITLA members and private radio licensees, and assuming all other considerations can be adequately addressed (capacity, uniqueness of need, prioritization, etc.) -- which they can't be -- how far must prices fall before commercial providers become a viable alternative to in-house systems and; 2) from the perspective of the commercial provider, how far can prices fall before the company is placed in the untenable situation of "what I lose on every sale I make up in volume?" There is a third consideration, too often forgotten by parties discussing supply and demand laws, but obvious to every businessperson and first year finance student: what level of profits will satisfy the firm's required rate of return .

The following is a brief overview of available commercial service alternatives and average pricing. Since ITLA members utilize both voice systems and analog data dispatch systems both types will be discussed.

Pricing of Alternatives

Specialized Mobile Radio (SMR)

SMR, in general, offer similar service to that required by the taxi and livery industry. Nationwide, monthly usage fees for analog voice dispatch service are in the range of $12-$16 per mobile unit. This fee commonly includes unlimited air-time: however in major metropolitan areas there is an upper limit on usage due to capacity constraints. Digital dispatch services, most notably Nextel, have service pricing easily double the foregoing figure.

Circuit Switched Cellular

Circuit switched cellular service is the typical telephone service offered. The average monthly cellular bill now averages approximately $50. Generally, there is a monthly access fee and additional per minute charges for usage. Most typically there is a trade-off between access and per minute fees (low volume users pay low access fees and high per minute fees, high volume users the reverse). Cellular switched services are clearly inappropriate from a pure technical perspective for taxi and livery service since telephone interconnect and dispatch services are unique and dissimilar offerings. While the prohibition against cellular operators offering dispatch service was removed in 1995, we know of no operator who has announced an intention to provide dispatch service.

Cellular Digital Packet Data (CDPD)

CDPD networks have been built by some cellular companies as an overlay atop their existing networks. The overlay utilizes empty space in the frequency/time domain and retreats when these spaces are reclaimed by conventional, *i.e.*, higher priority, telephone traffic. The mechanism is not seamless to users or operators of cellular systems. Thus carriers only allow a small number of the available voice channels in any cell to be allocated to CDPD service: capacity is limited, and performance decreases dramatically during the busy hour when call volume is at its maximum. Service rates are based upon packet counts, typically $0.04 per 240 characters.

ARDIS/RAM

The ARDIS/RAM data network covers the populated areas of the U.S. with a macrocell architecture network. In general the major metro areas have 5-10 available frequencies. Usage fees are packet-based, starting at approximately $20 per 20,000 characters and increasing to $190 per 750,000 characters.

Two-Way Paging

Companies which have procured spectrum in the narrowband PCS auction, have announced an intention to provide two-way data capabilities. Companies such as Sky-Tel have announced prices for service in the range of $24 per month, slightly above the current average for one-way alphanumeric service. For that fee, approximately 8 kilobytes (80, 100 byte messages) of traffic is allowed. However, penalties for overuse are substantial, approximately $0.50 per message. These penalties are designed to limit the average user's message traffic due to severe capacity limitations.

Broadband PCS

At the present time, no Broadband PCS licensee has announced an intention to provide dispatch service. Proponents of various technologies, specifically CDMA and to a lesser extent Omnipoint, claim that their equipment will allow users to receive bandwidth-on-demand for high digital data throughput applications. However, there are no operating systems or proposed pricing.

A Hypothetical Monthly Bill

For an ITLA member utilizing a conventional voice dispatch system, analog SMR providers are the most economical alternative among those available. As stated above, service pricing is on a per mobile unit basis. For rural operators with few vehicles, SMR is an alternative if price is the only consideration -- which it is not.

However, from our sampling of ITLA members and the survey responses received, the average number of vehicles -- taxi, limousine, delivery/sedan and van/minibus -- serviced by the communications system of a typical medium to large market operator is 265. Even at the low end of the SMR price range ($12), an average monthly bill of $3,180 and a yearly expense of over $38,000 is the result. In addition to this monthly bill, the taxi operator would be faced with an immediate expense of $265,000 for replacement of the mobile radios in the fleet (at $1,000 per radio, a median price for a dispatch type-radio). Moreover, using conservative assumptions[9], a p.02 grade of service and the Erlang B traffic tables show that a commercial operator would have to dedicate a **9 channel trunked** group to service this load.

Many of the ITLA survey respondents have already implemented analog data dispatch systems. These can generally be found in major metropolitan areas with severe congestion problems. For those ITLA members the average number of one-way transmissions per day is over 85,000. Assuming a relatively modest 100 byte message size, the transmitted byte count is 850,000 per day and 25.5 million per month. The average monthly bill on the ARDIS/RAM system would be

[9] Assuming one-third of the fleet is in operation, 2 dispatched calls per hour per in-use vehicle, 15 transmissions per dispatched call, 5 seconds per transmission, yields 3.64 Erlangs.

$6,460[10]: a monthly CDPD bill would be **$1.2 million**.

A base station -- transmitter and power amplifier, antennas, line, *etc.* -- normally costs no more than $35,000 to $50,000[11]. These costs are depreciated over their useful life, generally for book purposes 7 to 10 years. Assuming a 7 to 10 year real life on capital equipment, a forced transition to commercial providers of voice dispatch service would represent -- at the lowest end of the price range -- an almost tenfold increase in cost. The circumstances of an operator who had already converted to data dispatch would be worse. Also, operators who have converted to data dispatch systems have generally kept their voice dispatch system as a hot-standby backup in case of a catastrophic failure. Consequently, for those operators who have made the investment in more efficient technology, a forced conversion to commercial systems would require subscription to both voice and data service ---a massive increase in expense.

How Low Can Prices Go?

The foregoing analysis clearly demonstrates the historical economic rationale for private radio service. One can easily see that the consumer's cost for taxi and livery services has been moderated by the industry's investment in its communications systems.

Yet, it is not unreasonable to make the argument that with 150 MHz of spectrum being placed into service from Broadband PCS alone, that prices will fall. However, even if the above-calculated rates were reduced by half, the monthly expenditure would represent a significant increase in expense to large and medium market taxi and livery companies. Moreover, this analysis does not reflect the cost to replace the mobile radios themselves, a very real possibility in a mandated conversion to a commercial system.

Even with a 50% price reduction, this dramatic increase in cost would initially be borne by the

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[10] One ITLA member -- whose data is not included in this survey since it is so far out of the norm -- transmits, on average 800,000 message units per day. Using the same methodology, this company's average monthly bill on the ARDIS/RAM system would be in excess of $608,000.

[11] According to our survey, we can deduce that base station infrastructure is a relatively small portion of the total infrastructure investment of ITLA member companies. The largest expense is for the vehicle-mounted mobile radios, followed by the operator consoles, computer control equipment, tracking software, etc.

companies themselves. Since taxi and livery companies are, in general, licensed by a particular jurisdiction they are also most often subject to rate regulation. Eventually, the cost would be passed on to the consumer, including the elderly, disabled and low-income riders who rely disproportionately on taxis to meet their transportation needs.

Issues of Finance

In the pure financial sense, businesses are not purchased, cash flows are. The prices paid for a wireless business or for raw spectrum at auction represent the individual and collective judgement of the participants regarding the cash flows which will accrue to the purchaser in the future.

Economic policy making, while mindful of supply and demand, more often than not forgets that businesses must generate an adequate return on investment or the investment won't be made. The shape and slope of the supply curve[12] is determined by numerous inputs, one of the most important being the cost of capital.

For the purposes of this discussion, the question presented is whether commercial providers can generate an adequate return on their invested capital at significantly lower prices. As discussed previously, prices for voice dispatch service average $12-$16 per month nationally. Profit margins average 25%-30%. A 50% reduction in service revenue per unit would put most SMR companies out-of-business, unless there was:

1. a dramatic increase in the number of customers;
2. a correspondingly dramatic decrease in operating expense;

So as to offset

3. the reduction in revenue per subscriber; and
4. the increased capital equipment expenditures to service the larger subscriber base.

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[12] The presumption that prices for wireless telecommunications services will fall if the supply of spectrum is increased is probably true, but not necessarily true. The availability of spectrum is only one component of the supply curve for wireless service.

If we increase the supply of McDonalds restaurants -- place one on every corner -- that does not mean that hamburger prices will fall to a tenth of what they are now.

Even if hypothetical 50% price reductions could be tolerated in the short run, profit margins would suffer. Investors in these companies would see a reduction in return. When return on investment falls below what could be made in other alternative investments with less risk, capital flees. While present prices for data transmission computed earlier are astronomical, the same financial principles apply to the investors in these companies as well.

One can reverse-model[13] the prices paid in recent spectrum auctions, using an estimate of the winning bidder's cost of capital, to derive individual expectations of future service pricing, profit margins and capital infrastructure cost. The conclusions drawn is that no one expects price reductions of the magnitude discussed in the previous paragraphs.

If a "price war" does break out in the provision of wireless telecommunications services, there will be winners and losers on the commercial side, about which the Commission is justifiably ambivalent. However, if private radio services are forced to procure service from commercial providers during a period of turmoil, then critical communications needs -- service to the public -- will be adversely affected.

THE FUTURE

The trend within the industry, confirmed by our survey, is implementation of automatic dispatch systems using analog data. Purchase and deployment of automatic dispatch systems is change of an incremental nature, can be prudently managed and justified economically. The basic features and benefits of data dispatch systems are summarized below.

Assigning Attributes to Drivers -- Requests for special service are automatically matched to drivers who can provide the requested service, *e.g.*, will accept credit cards or checks, has been trained to assist disabled persons, permits smoking, has station wagon for extra luggage space, will assist disabled vehicles with a jump start or entry into a locked car, speaks Spanish, *etc.* Quality and speed of service to the public is greatly enhanced.

Customer Identification & History -- The computerized data dispatch systems track each customer's usage of service. When each customer calls for service their profile is

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[13] The most rigorous technique available to calculate investment returns and market value is the "discounted cash flow" (DCF) method. While such an analysis is beyond the scope of this report, such an analysis could be prepared and submitted to the Commission.

automatically available to the service representative. This feature enhances service quality, and speeds the delivery of service.

Trip History -- Every aspect of the customer's request for service is tracked by the system. Tracking trip history is used to resolve disputes, and to monitor customer service and service areas so that proactive steps can be taken for improvement.

Exception Warnings to Dispatcher -- The system will alert the dispatcher if there is a service problem, *e.g.*, too many drivers are rejecting the trip, the driver turns meter on and off too quickly indicating he did not serve the trip, if it takes too long for the taxi's meter to come on, etc.

Message To and From Drivers -- Messages to and from drivers are handled faster and with less air time when sent by a data dispatch system. Typical messages include: call canceled, passenger cannot be found, request for estimated time of arrival (ETA) to passenger pickup, call passenger to come out to vehicle, *etc.* Because computer dispatch communications are more efficient, service to the customer is improved via add-on services such as having the dispatcher telephone the customer to tell them their vehicle has arrived and they should now go outside to meet the driver.

Trip Report -- The system tracks where the requests for service (trips) are being generated and where the taxis and liveries are currently located. Drivers use the trip report feature to determine where they will post to wait for a request for service. This feature enables the drivers to strategically place themselves to speed delivery of service to the public. Moreover, for those companies with multiple base stations, the message can be directed to only that transmitter in which the vehicle is located, eliminating the need for simulcasting.

Miscellaneous -- The computer dispatch system accomplishes many other functions that are used to enhance customer service, *e.g.*, credit card verification, call vehicles in for routine maintenance, emergency distress button to alert dispatch that the driver is in a threatening situation, *etc.* These additional features expand and enhance the taxi and livery industry's ability to provide a variety of services to the public.

With increased capacity, fleet operators demand more from their communications system: more information is passed between driver and dispatch center, and the result is improved service to the public using the same amount of spectrum at little or no increase in cost. However, a forced migration to commercial systems would require taxi and livery fleet operators to limit their